

# The Association of Hygiene Sanitation Storing and the Presence of Escherichia coli Bacteria at Sambel Tumpang

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## ABSTRACT

Pecel tumpang is one of the typical traditional culinary of Kabupaten Kediri which has been known worldwide. The leftover sambel tumpang (kind of sauce) which is served in one day, usually be stored and be sold for the next day. The improper storing of it will result in the contamination of microorganisms in sambel tumpang. The occurrence of contamination in storing stage is caused by the cook/chef hygiene, the storing sanitation treatment, the sanitation of the equipments, and the storing sanitation environment. This study aimed to analyze the association of Hygiene Sanitation Storing and the Presence of Escherichia coli Bacteria. This study used observational design with cross-sectional approach. It was conducted on 15 nasi pecel tumpang vendors in kampung Inggris. The analysis of the association between storing sanitation and the presence of E.coli used the contingency coefficient test ( $\alpha=5\%$ ). The results of the association analysis between storing sanitation and the presence of E. coli were as follows: there was no association between cook/chef hygiene with the presence of E. coli, there was no association between storing treatment and the presence of E. coli, there was no association between sanitation of the equipment and the presence of E. coli, there was a significant association between storing sanitation environment and the presence of E. coli. The condition of storing sanitation environment of sambel tumpang in Kampung Inggris was very supportive to the growth and development of the microorganism, both bacteria and mold. The environmental conditions included moist air, non waterproof floor, the source of contaminants such as waste, and the presence of insects / flies. In order to prevent the contamination of E. coli, the vendors must pay attention to the state of the environment. The storing environment of sambel tumpang should always be freed from trash and insects / flies, and never forget to secure and close the sambal tumpang

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## I. Introduction

One of the traditional culinary specialties Kediri, which has been widely recognized by the public is pecel overlap. Pecel cone is a healthy food dish with vegetables soaked with sauce and sambal tumpang. Sambel pecel overlap created with the main ingredient old tempe (Medem) and new tempeh combined with spices. Overlapping only be a complement to the menu pecel overlap, so that often overlap is not exhausted sauce served in a single day. Sambel overlap is not exhausted in one day, finally saved up for sale the next day. How improper storage will result in the entry of microorganisms (contamination) in sambal overlap.



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The existence of microorganisms in the sauce overlap could be the cause of food poisoning (food poisoning). Today food poisoning to be one of public health problems encountered in modern times (Hartono, 2006). Food poisoning is caused by microbes, which include bacteria, parasites, viruses, algae, microbial toxins and toxic fauna. (Winarno, 2004). The entry of microbes into the food can happen at this stage of the food material selection, processing and presentation of the food was less precise (Arita, 2012). In the HACCP Module 2015, stated that the contamination of food can start from plant maintenance, harvesting, cleaning or washing, food preparation or processing, presentation and storage. While the sources of potential contamination antarlain: food handlers, processing equipment and utensils, as well as their cross-contamination.

This study aims to establish safe sanitation pengaruhhygiene against E. Coli bacteria content in the sauce tumpang. Keberadaan relations between the two variables can be used as the basis for the determination of solving food poisoning that occurs in an overlap sauce or other traditional foods.

## II. Method

The design of this study was observational with cross sectional approach. Sample size was determined by the formula Slovin and obtained by 15 sellers pecel overlap in Kampung England District of Pare. Observasi made to the state sanitary hygienic storage of overlap sauce as an independent variable, microbiology and quality sauce overlap as a result variable. Both variables will be analyzed to establish whether or not the independent variable on the dependent pengaruh. Analisis correlation between the two variables is obtained with contingency coefficient test, with  $\alpha = 5\%$ .

## III. Results and Discussion

### A. Selling Points Conditions

Data berjalan meliputi conditions of the ownership status of selling, distance selling of roads and buildings. This data can provide a picture of the situation trader overlap Adadi pecel Kampung English and may be confounding (confounders) that may affect the independent variable and dependent relationship. More details general data of respondents, shown in Table 1.

**table 1**  
**Selling Points conditions Nasi Pecel Overlapping**

No.	Data	n	%
<b>1</b>	<b>Owners Points</b>		
	Public facilities	6	40.0
	lease	4	26.7
	One's own	5	33.3
<b>2</b>	<b>Distance Points Sale By Road</b>		
	<3 meters	6	40.0
	≥ 3 meters	9	60.0
<b>3</b>	<b>Building type</b>		
	without Buildings	2	13.3
	Cart	1	6.7
	Tent	5	33.3
	Car	1	6.7
	Semi Permanent Building	1	6.7
	Permanent building	5	33.3

Kampung British crowds caused by the many newcomers to attend a foreign language course. This situation is exploited by people to open a business selling, including selling pecel overlap. All angles in the British village used as a place to sell. From 15 sellers pecel Kampung overlap in the UK, there are 40% who opened his stall alongside a road that is less than 3 meters, and 40% utilize public facilities. Roads and public facilities into a potential place to hold merchandise. This situation dapatmemperbesar potential for contamination of the food sold including, sauce overlap. Potential contamination can also be derived from a type of building that is used to vend, from the research data is known, that there are 13,

## B. Overlapping Sambel Storage Sanitation Hygiene

### 1. Overlapping Sambel handlers Personal Hygiene

Data handlers sambel overlap personal hygiene includes cleanliness of the skin, fingernails and hand washing behavior. Description of personal hygiene overlapping storage sambel detailed in Table 2.

**table 2**  
**Overlapping Sambel handlers Personal Hygiene**

No.	Subvariable Personal Hygiene	n	%
<b>1</b>	<b>Skin disease</b>		
	Handler / presenter does not bepernyakit skin	14	93.3
	Handler / presenter skin bepernyakit	1	6.7
<b>2</b>	<b>Fingernails</b>		
	Handlers not long nails	12	80.0
	Handlers long nails	3	20.0
<b>3</b>	<b>Hand washing</b>		
	Handlers always wash your hands before and after serving	3	20.0
	Handlers do not always wash their hands before and after serving	12	80.0

Table 2 shows that of 15 handlers sambel overlap, there is a 6.7% handlers were sick kulit. Hasil research also found 20.0% handlers sambel tumpangmemiliki long nails and less clean. Hygiene state of handlers is not in accordance with handlers who terdapatdi dalamKeputusan Minister of Health No. 1096 / Menkes / Per / VI / 2011. It is stated that in order to avoid contamination of food, the food handlers should be free from skin diseases.

Sambel overlapping behavioral data handlers to hand washing, showed 80.0% handlers not washing their hands when they wanted to deal with overlapping sauce. This situation is not in accordance with the provisions contained food handlers in the Minister of Health No. 942 / Menkes / SK / VII / 2003. In Permenkes stipulated that food handlers should wear aprons and headscarves and always wash your hands every going to handle food. Siti (2010) stated that in general, hand washing can not be a culture for the people of Indonesia

### 2. Sanitary Treatment Storage Sambel Overlapping

Data storage sambel overlapping treatment includes the use of a special lid and cabinets, as well as the presence of contaminants. Description sanitation perlakuanpenyimpanan overlap sambel detailed in Table 3.

**table 3**  
**Overlapping Sambel Storage SanitasiPerlakuan**

No.	Sub variable storage Treatment	n	%
1	Sealed after the cold	0	0,00
	Not sealed after the cold	15	100.00
2	Separately with raw materials	12	80.00
	Not separately with raw materials	3	20.00
3	Saved special dilemari	0	0,00
	Not saved special dilemari	15	100.00

From Table 3 note that from 15 sellers overlap, all (100%) to let the sauce cook tumpannya that are in place in an open state, before being moved to the place the presentation. Results of interviews with overlapping seller also found that 20% of data overlap ripe sauce placed side by side / close with other raw materials that have not been cooked. In addition to these circumstances also found that 100% overlap ripe sauce not kept in a special cupboard. Points cooking / sauce pan containing the sauce overlapping overlapping cook cooking placed close to the furnace.

The treatment of overlapping sauce that is not put in place / special cabinets, containers are always given an open cavity, and placed adjacent to vegetable / other raw materials, is a common picture in the kitchen of Indonesian society. Critical point of this treatment is the state of the sauce container overlap is left in the open state ranging from finished cooking to be served. From the information the seller is known that overlap sauce container is left open when it is still hot is not so perishable. Conditions such as this give a chance to the microorganisms in the kitchen easier to contaminate sauce overlap. As a solution to this problem is the use of pot lids with air holes that are not in direct contact with the outside air.

Alternative treatments overlap sambel storage to prevent contamination of microorganisms, if it does not have a refrigerator is wearing two overlapping sauce containers with lids tightly. The first container is used for the sauce overlap that will be stored for sale the next day, and another one for the sauce container that overlap will be sold on the same day. Next leftover sauce overlap is not sold out no longer with the sauce made the overlap will be saved.

Another storage way, if the seller has a refrigerator is to store the sauce overlap in temperature 7 ° C - 10 ° C. With the temperature of overlapping sauce can last up to one week ahead without any changes.

### 3. Overlapping Sambel sanitation Storage Equipment

Observation overlapping storage equipment sambel conducted to determine bahandasar tools, cleaning tools and storage devices sauce overlapping conditions. The results of the observation equipment is shown in table 4.

**table 4**  
**Overlapping Sambel sanitation Storage Equipment**

No.	Subvariable Sanitation Tool	n	%
1	Made of metal	15	100.00
	Not made of metal	0	0,00
2	Clean	15	100.00
	Not clean	0	0,00
3	Dry	15	100.00
	Not dry	0	0,00
4	surface intact	15	100.00
	The surface is not intact	0	0,00

Table 4 shows that 100% of sellers who use the equipment in a clean and dry. The results of observation also get data that 100% overlap sauce container for storage in the intact condition. The state of equipment which meets the requirements of this storage equipment will reduce the contamination in addition to the overlap disimpan. Dalam sauce Permenkes No. 1096 / Menkes / Per / VI / 2011, stipulated that the sanitary equipment is used to control risk factors for contamination of the food.

#### 4. Saving Places Sambel FisikLingkungan conditions Overlapping

Data storage environment sanitation overlap sauce covering subvariable cleanliness, humidity, lighting and the presence of insects / vermin. Detailed data storage environment sanitation overlap sauce, shown in Table 5.

**table 5**  
**Environmental Sanitation Saving Places Sambel Overlapping**

No.	Subvariable Environmental Sanitation	n	%
1	Clean	12	80.00
	Not clean	3	20.00
2	not humid	5	33.33
	Moist	10	66.67
3	illumination enough	15	100.00
	lighting less	0	0,00
4	roof of the net	12	80.00
	The roof is not clean	3	20.00
5	The floors and walls watertight	5	33.33
	The floor and walls are not watertight	10	66.67
6	No insects	3	20.00
	There are insects	12	80.00
7	No source of pollution	0	0,00
	There are sources of pollution	15	100.00

Overview sambel overlapping storage environment conditions are not much different than the environment in which the presentation of an overlap sauce. Because 50% of the seller's pecel cooking sauce tumpannya overlap into one with a presentation or berjualannya place.

For storage environment hygiene conditions overlap sauce contained 80% are categorized as clean. Clean here interpreted as a place free of trash scattered about, because the garbage has been put into the trash or put in a plastic bag. Three sellers who do not clean their environment as are the remaining raw vegetables or plastic food wrap that is not put in the trash. Trash can with a lid that is used by the seller only as much as 6.7%, whereas that is not covered by 93.7%. This situation causes that the storage environment is a source of contaminants overlap sauce for sauce overlap. Of the environment is not clean and the trash that is not covered be towing the arrival of insects and other vermin. From the observation of the presence of insects / flies the data obtained bahwa 80% overlap sauce into a storage area where rest or feeding flies. Potential contamination sambel growing overlap when viewed from the condition of the floor, walls and roof. Conditions were wet floor as close to the sink causes the air becomes humid, and this moisture will berengaruh to the development of microbes such as bacteria and jamur. Penelitian Achmat (2015) states that the optimum humidity for the growth of bacteria including *Escherichia coli* bacteria was 85%. Therefore the humidity of the room should be pursued in order not correspond to the optimum moisture bacteria. Dipersyaratkan moisture for a healthy home by Minister of Health No. 1077 / Menkes / Per / V / 2011 was 40% -60%.

### C. Overlapping Sambel Quality

Sambel quality of overlap can be seen physically as well as content of microorganisms. Physical kedaan sauce can overlap the visible to the naked eye, whereas the content of microorganisms is determined by laboratory testing.

#### 1. Physical state

Data physical state sambel overlap obtained by interview and observation of the sample are obtained. The physical state of the fallen sambel include age, color, flavor and consistency. Data physical state sambel overlap detailed in Table 6.

**table 6**  
**Overlapping Physical Quality Sambel**

No.	Subvariable Physical Quality	n	%
<b>1</b>	<b>Age</b>		
	1 day	10	66.67
	2 days	4	26.67
	3 days	1	6.67
<b>2</b>	<b>Color</b>		
	greenish white	1	6.67
	Brownish white	4	26.67
	Light brown	4	26.67

	Yellowish-brown	2	13.33
	Dark brown	4	26.67
<b>3</b>	<b>aroma</b>		
	Aroma new tempe	6	40.00
	Aroma old tempe not sting	4	26.67
	Aroma seared tempeh old	5	33.33
<b>4</b>	<b>consistency</b>		
	Liquid	3	20.00
	Thick	12	80.00

Direct observation of the physical conditions of fifteen sambel overlap the data obtained that the majority (66.67%) overlap sauce freshly cooked in the morning, but there were 6.67% sambel overlap aged 3 days. Overlap sauce served during the 3 days was produced in large quantities compared with other sellers. Sambel storage for 3 days overlap becomes a risk factor for pollution, and therefore required a particular way of doing storage. Cone sambel storage cabinets can be performed in a low-temperature, but the sauce overlap stored for 3 days can alter the nutrient content in dalamnya. Nurhayati et al (2007), said that the changes occurred in the nutritional value of food disimpanselama 3 haridalamshudingin.

The color and aroma of the sauce overlapping physical state that is influenced by the main ingredient sauce overlap, namely tempe. Warna and aromas used in the manufacture of tempeh sauce overlap greatly affect the display color and flavor sauce overlap. Tempe used in making sauce overlap of two kinds, namely soybean tempeh are still new and old (Medem). From interviews with the trader in mind that the new composition of tempe and Medem will affect the color and aroma of the sauce tumpang. Tempe Medem who have aged 2 or 3 days as the main ingredient sauce overlap generally blackish brown with a penetrating aroma. Medem tempe conditions like this, when cooked with seasoning / spices will give the dominant color and flavor in the sauce overlap. From the research, obtained the data that overlap sauce brownish white, light brown and dark brown -masing 26.67% respectively. In terms of aroma, as much as 40.00% of new soybean sauce flavorful overlap. Thus the color and aroma of the sauce overlap is determined by the color and flavor tempeh Medem and composition between new tempe and tempe Medem used. While the sauce consistency is more overlap is determined by how much water is added

## 2. Microbiological Quality Sambel Overlapping

The content of *Escherichia colipadasambal* overlap an indicator of whether or not the sauce overlap safe for consumption. The existence of *Escherichia colipada* sambel complete overlap shown in Table 5.

**table 7**  
**Distribution Presence Echericia coli On Overlapping Sambel**

No. samples	Existence	No. samples	Existence	No. samples	Existence
1	There is	6	There is no	11	There is
2	There is	7	There is	12	There is
3	There is	8	There is	13	There is

4	There is	9	There is	14	There is
5	There is no	10	There is	15	There is

Penentuan whether the indicator *Escherichia coli* qualified or not, the quality standard of SNI 01-2897-1992 about Microbial Contamination Test, as well as ISO 7388: 2009, of the Maximum Limit of Microbial Contamination in Food. Test results obtained samples of data that as many as 86.7% of the sample is not safe for consumption because it contains *E. coli*, while 13.3% safe for consumption because it does not contain *E. coli*. Sambel overlap is safe to eat is processed traders sambel overlap with sample numbers 5 and 6.

#### D. Sanitation Association of Storage With Content *E. coli*

Sanitation association with a content storage area *E. coli* in detail is shown in table 8.

**table 8**

Sanitary Inspection Association Storage With the presence of *E. coli* Pada Sambel Overlap ( $\alpha$ : 5%)

No.	Sanitary items	Microbiological Quality		<i>p value</i>
		Secure	Not safe	
1.	Storage equipment - score 5 - score 6	<b>0</b> (0.0%) <b>2</b> (18.2%)	<b>4</b> (100.0%) <b>9</b> (81.8%)	<b>.360</b>
2.	treatment Storage - score 3 - score 4 - score 5	<b>0</b> (0.0%) <b>2</b> (20.0%) <b>0</b> (0.0%)	<b>4</b> (100.0%) <b>8</b> (80.0%) <b>1</b> (100.0%)	<b>0.562</b>
3.	Storage environment - score 1 - score 2 - score 3 - score 5 - score 6	<b>1</b> (100.0%) <b>1</b> (100.0%) <b>0</b> (0.0%) <b>0</b> (0.0%) <b>0</b> (0.0%)	<b>0</b> (0.0%) <b>0</b> (0.0%) <b>9</b> (100.0%) <b>1</b> (100.0%) <b>3</b> (100.0%)	<b>0,050</b>

Table 6 shows that of the three items of sanitation, there is only one real association, the association between storage environment with the presence of *E. coli* (*p value*: 0.050). Sambel storage environmental conditions overlap very supportive place to grow and berkembangnya of microorganisms, both bacteria and fungi. The environment is humid, the floor was not watertight, the source of contaminants from waste, as well as the presence of insects / flies. From Table 3 is also known that the potential of microorganism contamination of the environment the greater the case, because the overlap sambel storage container is not sealed (100%). The results are consistent with research Susana (2009), which states that the food served in the state is not covered, associated with the incidence of *E. coli* contamination. From Table 3 is also known that contamination overlap sauce can also be caused by the treatment that is not good, the sauce overlap is not stored in special cabinets (100%). In Table 2 mentions that sambel handlers who do not wash hands overlap



as much as 80%. The behavior of these handlers can also contribute to contamination terjadinya sauce overlap.

The existence of *E.coli* in the sauce can overlap resulting from contamination trash scattered or out of the trash that is not covered. These results are consistent with research Susana (2009), which states that there is a significant correlation between the availability of trash with *E. Coli* contamination. Presence of insects / flies in the storage environment sambel overlap as shown in table 5 is also a supporter of *E. coli* contamination. The condition is not in accordance with the requirements of the kitchen listed on the Health Minister Decree No. 715 / Menkes / SK / V / 2003 on hygiene and sanitation catering services. In this decision determined that the kitchen should be free of insects and rodents.

#### **IV. Conclusion**

##### **1. Storage sambel overlap**

-Peralatan used 100% has used metallic materials intact and clean.

Storage -Perlakuan made by the seller is still not good, because there is a 100% container is not sealed, 100% not kept in special cabinets and 20% are still kept together raw materials.

Sambel-environmental storage areas overlap 100% have adequate lighting, 60% of the air is humid, 80% roof of the net, 66.67% water-resistant flooring, 80% are insects / flies and 100% are the sources of pollution in the form of garbage.

2. Test results obtained 86.67% of *E. coli* contaminated with *E.coli* overlap sauce

3. Equipment and storage treatment does not affect the quality of the sauce overlap, but the storage environment significantly affect the quality of overlapping sauce.

#### **V. Suggestion**

1. Storage environment is a factor that Affects the presence of *E. coli* in the sauce overlapping, therefore, the seller must pay attention to the environment, especially should always be free of litter and always closes tightly overlapping sauce.

2. Need a special design of overlap sauce heat resistant container, tightly covered, but did not cause stale if left in a hot state.

3. Health care workers and related services Necessary to provide guidance and training to the seller pecel overlap, on how to manage food properly.

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